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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/922,804	08/07/2001	Michikazu Matsumoto	740819-610	8887
22204	7590	03/17/2004		
NIXON PEABODY, LLP 401 9TH STREET, NW SUITE 900 WASHINGTON, DC 20004-2128			EXAMINER ERDEM, FAZLI	
			ART UNIT 2826	PAPER NUMBER

DATE MAILED: 03/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

09/922,804

**Applicant(s)**

MATSUMOTO ET AL.

**Examiner**

Fazli Erdem

**Art Unit**

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 24 November 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 6 and 10 is/are allowed.
- 6) ☒ Claim(s) 1-3 and 7 is/are rejected.
- 7) ☒ Claim(s) 4,5,8 and 9 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Allowable Subject Matter***

1. Claims 6 and 10 allowed.
2. Claims 4, 5, 8 and 9 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Agarwal (6, 218,256) in view of Agarwal (6,465,828) further in view of Ouellet (5,747,361) further in view of Suguro (6,271,573).

Regarding Claim 1, Fig. 7 of Agarwal shows an electrode and capacitor structure for a semiconductor device where detail 10 is the substrate, followed by polysilicon layer 48, insulating layer 14, Titanium nitride barrier layer 16 and a high melting point conductive layer 18.

Regarding Claim 3, in columns 10-12, Agarwal discloses the method of making an electrode and capacitor structure of Fig. 7.

Agarwal (6,218,256) fails to disclose the required barrier layer and the required stoichiometric structure. However, Agarwal (6,465,828) discloses a semiconductor container

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structure with diffusion barrier where the required barrier layer is disclosed. Furthermore, Ouellet discloses a stabilization of the interface between aluminum and titanium nitride where the required stoichiometric structure is disclosed.

Agarwal ('256), Agarwal ('828) and Ouellet combination fail to disclose the required gate electrode/gate insulating film relationship. However, Suguro disclose a semiconductor device with gate structure and method of manufacturing the same where the required gate electrode/gate insulating film relationship is disclosed.

It would have been obvious to one of having ordinary skill in the art at the time the invention was made to include the required gate electrode/gate insulating film relationship in Agarwal (6,218,256), Agarwal (6,465,828) and Ouellet combination as taught by Suguro, in order to have a semiconductor interconnection structure with better performance.

4. Claims 2 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagasaka et al. (5,973,408) in view of Ito et al. (5,561,326) further in view of Suguro (6,271,573)

Regarding Claim 2, Fig. 1 of Nagasaka et al. show an electrode structure for a semiconductor device where two titanium nitride films 261A and 261B are located above a protective films 35 and 34. An electrode wiring 151 is positioned above the two titanium nitride structures 261A and 261B. Nagasaka does not show the second titanium nitride structure to have a higher nitride structure. However, Ito et al. show a large scale integrated circuit device where in Fig. 2 two titanium structures 186 and 187 a located. Ito et al. further disclose that the second titanium nitride structure has a higher nitride ratio.

Regarding Claim 7, Figs. 1-4 of Nagasaka et al. and the Figs. 1-10 of Ito et al. show a method of making an electrode structure with two titanium nitride layers one with the second titanium nitride layer having a higher concentration of nitride.

Nagasaka and Ito et al. combination fail to disclose the required gate electrode/gate insulating film relationship. However, Suguro disclose a semiconductor device with gate structure and method of manufacturing the same where the required gate electrode/gate insulating film relationship is disclosed.

It would have been obvious to one of having ordinary skill in the art at the time the invention was made to include the required gate electrode/gate insulating film relationship in Nagasaka et al. and Ito et al. combination as taught by Suguro, in order to have a semiconductor interconnection structure with better performance.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

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however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fazli Erdem whose telephone number is (571) 272-1914. The examiner can normally be reached on M - F 8:00 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on (571) 272-1915. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

FE

March 7, 2004

**TECHNOLOGY CENTER 2800**  
**SUPERVISOR/PATENT EXAMINER**  
**NATHAN J. FLYNN**